lelism is found to exist. Thus from many lines of investigation it appears that the P.D. is an inverse measure of the virulence (toxigenicity) of diphtheria bacilli.

Inasmuch as the difference in P.D. between virulent and non-virulent strains of diphtheria bacilli is very great it was considered that it might prove possible to utilize the measurement of P.D. as a simple laboratory test for distinguishing virulent from non-virulent cultures that are sent to a laboratory in the routine diagnostic confirmation for diphtheria infection. In a series of 100 tests conducted in the division of laboratories and research in the Chicago Department of Health the results of virulence determination by the P.D. method were in accord with the routine animal test in 97 of 100 cases. We are at present engaged in an attempt to devise a simplified form of apparatus for the measurement of P.D. It is hoped that by using the electrical method it will be possible for a laboratory to make a virulence determination and report the result to the physician in a much shorter period of time than is now possible by the current guinea pig method.

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OPPOSING VIEWPOINTS IN THE SCHOOL VENTILATION CONTROVERSY*

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IT IS an interesting commentary on the importance of ventilation that two sections of the American Public Health Association should at an annual meeting join together for common discussion of this subject.

Ventilation has wide application—in churches, factories, meeting halls, mines, public buildings, railway coaches, restaurants, schools, stores, submarines, theaters—in fact all inclosures where people congregate in numbers.

The ventilation of school buildings is just one little corner of the whole ventilation problem. However, this corner has been the storm center of more controversy than any other section.

I shall try to portray to you in concise terms why school ventilation provokes controversy and to give you an insight into the opposing viewpoints.

About fifty years ago, Pettenkofer, in Germany, and Parkes, in England, put forward the idea that to safeguard people from being harmed by their own exhalations when congregating indoors, there should be a minimum standard of air change amounting to 30 cubic feet per minute per person. Such an air change would prevent the carbon dioxide from accumulating above 7 parts per 10,000. It was not that carbon dioxide itself was harmful, but it was felt that the carbon dioxide was a good index of the amount of other substances in the air which were dangerous to health.

This 30 cubic foot standard was definite, was suitable for engineering calcu-

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lations, and by the beginning of the present century it began to creep into state laws and regulations governing the ventilation of schools and factories. This standard could only be guaranteed at all times through the use of mechanical blowers; hence the 30 cubic foot provision indirectly prescribed mechanical ventilation.

It was not long before the school teachers discovered that the 30 cubic foot standard did not necessarily produce comfort. In fact, this standard could be doubled without necessarily producing comfort. There were many criticisms of the mechanically ventilated classroom and the teachers were not backward in expressing their views. The rooms were hot and stuffy, draughty and dry and lacked freshness. The teachers opened the windows to cool off; the janitor ordered them shut; teachers began getting madder and madder over these repressive regulations, and the janitors got gruffer and gruffer.

Meanwhile physiologists in Germany, England and the United States had been emphasizing since 1880 that it is not the chemical purity of the air which makes for comfort, but cool temperature. The main thing is, to prevent heat stagnation and not to worry even if the air flow standard is cut in two.

Mechanical ventilation was found unessential to comfort. In fact it was less comfortable than window gravity ventilation which the law prohibited.

The final stroke which caused the American Public Health Association to burst forth at its annual meeting in St. Louis last year with a stinging resolution* against arbitrary state laws on school ventilation, was a serious proposal on the part of certain people in St. Louis to compel the closing of the windows in the open air schools and the treating of the air with ozone. This was the last straw. The tuberculosis association drew the line at this and the public health fraternity went definitely on record in protest against the unwarranted invasion of the ventilating engineer into the field of public health and medicine.

That is the setting of the stage to-day.

I feel that I can give you a closer insight into the question by actually depicting a scene from the drama, "School Ventilation." The scene is laid in the lounging room of a city club. There are two characters, the "Window-Gravity Advocate" and the "Mechanical Ventilation Advocate." The time is the present.

Now, mind you, I am not saying these things. I am simply illustrating a typical conversation between these two characters.

The Window-Gravity Advocate is on the left side of the stage, the Mechanical Ventilation Advocate on the right.

The scene opens with the Window-Gravity Advocate speaking.

The Window-Gravity Advocate (with vehemence)—I tell you that the existing ventilation laws are tyrannical. They prohibit window gravity ventilation. Why not prohibit open air schools? Why not compel tuberculosis sanatoria to close their windows and treat their patients with 30 cubic feet? As it is now, a child has to be sick to get into an open window room.

The Mechanical Ventilation Advocate (soothingly)—I am not in sympathy with tyrannical laws, but you must think twice before repealing ventilation laws. It was a long, hard pull to get those laws enacted. There has been a lot of improvement under those laws. Better not repeal them until you are dead sure that you can specify something better.

The advantage of mechanical ventilation is that it is subject to control. Window ventilation is at the mercy of the weather.

The Window-Gravity Advocate (warming to the fray)—I am not so sure about this control business. Window ventilation is controllable. The direct heat is controlled either automatically or manually. Air flow is controlled by the windows. And the power to control it is in the hands of the people affected. If fan

*A. J. P. H., 15, 12:1101 (Dec.), 1925. Resolution on Schoolroom Ventilation.

ventilation is subject to so much better control why all the complaints against overheating? Why all the opened windows in fan ventilated rooms? Theoretically fan ventilation may be under control. Quite so, but what good is the control if it fails to make schoolrooms comfortable.

The Mechanical Ventilation Advocate (with finality)—It is unfair to expect a busy teacher to watch thermometers and open and close windows. Mechanical ventilation relieves her of all this worry. Window ventilation subjects the children in the outside aisle to icy draughts from the windows or extreme heat from the oversize radiators.

The Window-Gravity Advocate (with asperity)—Now, see here, you are not fair to window-gravity ventilation. You talk just like a recent article written by a former president of the American Society of Heating and Ventilating Engineers. Look at this picture with the article (holds picture aloft). It is supposed to represent the type of window ventilation advocated by the American Public Health Association and the New York State Commission on Ventilation. There are no less than six misrepresentations visible in the picture.

This window is open at the top.

The Ventilation Commission Report specifically taboos the top opening (see page 522).

This window is closed at the bottom.

The Report specifies opening at the bottom.

There is no deflector at the window.

The Report specifies a deflector.

There is no shield in front of the radiator.

The Report recommends such a shield.

The picture does not show automatic heat control, nor modulated hand control, nor a conveniently located radiator valve.

And yet the Report specifies these things.

Incidentally when you picture a schoolroom, never have the light coming in on the right side of the pupils and further always put some shades on the windows.

The title of this article is "Half Knowledge is Dangerous in Ventilation." I must confess that this title is superbly appropriate.

The Mechanical Ventilation Advocate (superciliously)—Well, I don't know that the engineers have any particular monopoly on exaggeration or misstatement. It seems to me I have read expressions about "canned air" and "God's free air." You must realize that air is not free even when it comes in the windows. It costs money to move air, whether you move it by heat or by electricity.

The Window-Gravity Advocate (disdainfully)—Costs money? Don't talk about cost.

Window-gravity ventilation is not only less costly to install but is cheaper to operate. McLure has shown that mechanical ventilation and indirect heating with individual ducts costs 50 per cent more than window-gravity ventilation to install. Furthermore, even after you install it, experience shows that mechanical ventilation is not operated outside the heating season in the majority of cities. In many instances it is not operated even during the heating season except on days of extreme cold. In some instances ventilation systems are not operated at all, and have not been for several years. The reason they have not been operated is the high cost of operation. I am told that for every four pounds of coal burned, only one is for heat, the other three for ventilating on the 30 cubic foot basis.

The Mechanical Ventilation Advocate (searchingly)—In advocating window-gravity ventilation the New York Commission report recommends extra radiation, larger exhaust ducts, larger space allowance per pupil and suggests that the leeward exposure of the building is not suitable for window ventilation.

How do you figure that window ventilation is less expensive when the building must be enlarged, the radiation increased, the vent ducts more than doubled, and all the rooms on one side of the building tabooed for school use?

(Triumphantly) Look here! Did you ever design or build a ventilating system?

The Window-Gravity Advocate (somewhat abashed)—No, I can't say that I ever did, (with rising courage) but I have spent considerable time inside of school buildings.

Were you ever in one of the newer types of window-gravity schools? Did you ever sit down in one of these schoolrooms for an hour or more and actually experience the sensation of window-gravity ventilation?

The Mechanical Ventilation Advocate (hesitatingly)—No, I don't know that I have.

The Window-Gravity Advocate (sarcastically)—Don't you think you could discuss the matter with better grace if you had a little more knowledge of the life within a schoolroom?

The New York State Commission found that there was less respiratory disease in window ventilated rooms.

The Mechanical Ventilation Advocate (skeptically)—That doesn't convince me. The buildings that were chosen to represent mechanical

ventilation were old models. Besides a number of years ago the Detroit Board of Education found that the window ventilated room was impossible and had more disease than the mechanically ventilated room.

The Window-Gravity Advocate (aggressively)—The Detroit study is not at all contradictory. The window rooms in the Detroit study were not window-gravity ventilation. In the first place, the gravity exhaust ducts were closed, the windows were covered full length with muslin screens and the rooms had a great excess of direct radiation all on one thermostat. The result of the Detroit study is exactly what one would expect and is confirmed by studies on this type of room by the New York Commission.

Another thing, the schools in the New York study were not all old schools. They were representative of the time and three buildings were of the very latest pattern and had just been opened.

It seems to me you always have excuses for the mechanically ventilated buildings that are studied.

The perfect building is always the one that you, but no one else, has visited.

The Mechanical Ventilation Advocate (splashing about wildly)—The trouble with the New York Commission is that they took a lot of data based on opinion. They had no scientific basis. They had no readings or facts to support their opinions.

The Window-Gravity Advocate (with heat, holding up report of New York Ventilation Commission)—Here are 200 pages of readings and facts! Why not look at them?

The Mechanical Ventilation Advocate (stubbornly)—The work was not scientific.

The Window-Gravity Advocate (patronizingly, yet with earnestness)—And yet 5 of the 6 members of the New York Commission are listed in *American Men of Science,* whereas I failed to find a single name representing the prominent critics of window ventilation.

(In best scientific manner) Is there not much more probability of attacking a problem without bias when 6 men are chosen from 6 different professional fields—education, medicine, chemical biology, public health, ventilating engineering, and physiology—and each representative is eminent in his field? Is not this better than a committee of all physicians, or all engineers?

The Mechanical Ventilation Advocate (with dying gasp)—H'm—you've got to be practical as well as scientific.

The Window-Gravity Advocate (defeated, yet still hopeful)—Well—what shall we do about it?

The Mechanical Ventilation Advocate—Er-r-r (as one inspired) we might refer it to a committee.

The Window-Gravity Advocate (thrilled with anticipation)—By Jove—that's a happy solution. Shake.

CURTAIN

And so, ladies and gentlemen, here we are.

MODEL HEALTH CENTER IN NEW YORK CITY

A model $250,000 health center for fighting sickness and death in New York's congested East Side district will be established in November by the Milbank Memorial Fund.

The new health center will be opened in a five-story brick building in the Bellevue-Yorkville Center district, and will house tuberculosis, social hygiene, dental and infant welfare clinics. The headquarters of the Community Health Center will be located there. The council in charge serves as the operating agency for the metropolitan health demonstration and it is composed of the New York City Department of Health and various other official and voluntary agencies, a number of which will have district offices in the building.

Rural Cattaraugus County and the city of Syracuse are included in the group known as the New York Health Demonstrations.

In making the announcement, John A. Kingsbury, secretary of the Milbank Memorial Fund, said:

"Under the leadership of their local health authorities these communities seek to indicate the more vital problems confronting modern rural, urban and metropolitan communities in forwarding the general health of their populations, and to single out those phases of such problems which will more readily yield to control."